



Sustainable Aviation Fuels

Fact sheet

What is SAF

Sustainable Aviation Fuel (SAF) is a liquid fuel currently used in commercial aviation which reduces CO₂ emissions by up to 80%. It can be produced from a number of sources (feedstock) including waste oil and fats, green and municipal waste and non-food crops. It can also be produced synthetically via a process that captures carbon directly from the air. It is 'sustainable' because the raw feedstock does not compete with food crops or water supplies, or is responsible for forest degradation. Whereas fossil fuels add to the overall level of CO₂ by emitting carbon that had been previously locked away, SAF recycles the CO₂ which has been absorbed by the biomass used in the feedstock during the course of its life.

SAF facts and figures

- It is a 'drop-in' fuel. No modification of airframe or engine is required to use SAF.
- It has been used in more than 350,000 flights as of mid-2021.
- There are currently seven approved processes for creating SAF.
- SAF is blended with regular jet kerosene. Currently the maximum blend is 2% SAF to 98% regular jet fuel. Successful tests using 100% SAF have been completed.
- Despite the challenges of COVID, production and use of SAF has increased substantially. In 2020, SAF use rose 66% on 2019 levels, and is estimated to be 60% higher in 2021 (about 110m million litres). But that is still significantly less than 1% of total jet fuel consumed. Limited supply means that it is on average three times more expensive than regular jet fuel. At current and anticipated production levels, SAF use could rise to 2% (7 billion litres) of all jet fuel (350 billion litres) by 2025, and 5% by 2030.
- Contrary to the ground transport sector, which can use electric energy, aviation has no near-term alternative to liquid hydrocarbon fuels.
- In the medium term, SAF will be the key energy solution to mitigate the emissions growth of the industry. Alternative power sources such as hydrogen and electric are expected to be available for short-haul flights, leaving SAF as the only viable alternative for long-haul flights, which are responsible for 75% of aviation's CO₂ emissions.
- SAF will be an eligible option for aircraft operators to meet their obligations under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).
- At the 73rd IATA AGM in Cancun, 2017, IATA members unanimously agreed a [resolution](#) on the deployment of SAF, including calling for constructive government policies, and committing to only use fuels which conserve ecological balance and avoid depletion of natural resources.
- Like conventional jet fuel, SAF requires a strict technical certification addressing that SAF:
 - Can be safely mixed with conventional jet fuel, can use the same supply infrastructure and does not require adaptation of aircraft or engines
 - Meets the equivalent or higher technical specifications as conventional jet fuel
 - 7 technical production pathways have been certified under ASTM d7566
 - Certification work continues and more are expected in the next 18 months

Sustainable Aviation Fuels in Practice

- Main milestones so far:
 - **2008** – The first test flight with biojet fuel was performed by Virgin Atlantic.
 - **Between 2011 and 2015** – 22 airlines performed over 2,500 commercial passenger flights with blends of up to 50% biojet fuel from feedstock including used cooking oil, jatropha, camelina, algae and sugarcane.
 - **January 2016** – Regular sustainable fuel supply through the common hydrant system started at Oslo Airport. Alternative fuel producer Neste and supplier SkyNRG as well as Air BP are involved.
 - **March 2016** – United became the first airline to introduce SAF into normal business operations by commencing daily flights from Los Angeles Airport (LAX), supplied by AltAir.
 - **October 2020** – More than 300,000 commercial flights using SAF have been performed, 45 airlines with SAF experience and 6.5 billion litres in forward purchase agreements.
- Several airlines have concluded long-term offtake agreements with biofuel suppliers, many of which are reported as commercially competitive. A number of airports have agreed to supply SAF through their hydrant systems.

IATA's Strategic Action Plan

- **Industry actions**
 - Developed an industry roadmap in 2015 highlighting best practice for technology adoption, policy and regulation, economics, sustainability and accounting standards
 - In September 2020 the Air Transport Action Group (ATAG) [Waypoint 2050](#) study was released. This examined the potential of different decarbonisation options, including some of the possible achievement trajectories for SAF out to the year 2050. It is technically feasible to replace very large quantities of traditional jet fuel with SAF over the coming decades.
 - Provide industry leadership and publicly available guidance material on best practice concerning sustainability standards, accounting procedures, logistics, communication, effective policy and business case development
 - Influence policy negotiations to ensure aviation can opt into existing ground transport policies, and in some cases, have aviation preferentially incentivized to use SAF
- **Role of governments**
 - Adopt globally recognized sustainability standards and work to harmonize global standards
 - Ensure existing policy incentive frameworks designed for ground transport, also include aviation and apply higher incentives for aviation over ground transport, which has other energy alternatives
 - Encourage user-friendly SAF accounting methods, including developing an industry designed functioning book and claim framework and seek to harmonize global standards
 - Support sustainable aviation fuel R&D and demonstration plants
 - Implement policies that de-risk investments into SAF production plants
 - Engage in public-private partnerships for SAF production and supply
 - Commit to policy certainty or at a minimum policy timeframe that match investment timeframes

Challenges and opportunities – both political and commercial

- Due to issues of scale and yet to be optimized processes, a number of SAF production pathways are more expensive than fossil Jet A/A1, especially at small scale.
- In the United States, a combination of incentives such as the Renewable Fuel Standard (RFS) and Low Carbon Fuel Standard in California, support for building up new-technology production plants and incentives for agriculture, can enable price-competitive SAF off-take agreements.
- In Europe, from 2020 the Renewable Energy Directive (II) (2020-2030) will apply a multiplier (1.2x) for producers making SAF rather than ground transport fuel. This policy has the potential to increase the production of SAF, especially if the value of the multiplier is reviewed as part of the ReFuelEU policy initiative.
- Some countries are considering country-wide plans for ending the use of fossil fuels. This implies material strategic considerations for aviation.
- The effectiveness of different policy mechanisms for commercially deploying sustainable aviation fuel has been assessed by the ICAO Alternative Fuel Task Force during the CAEP/11 cycle (2016-2019). Additional policy analysis will occur, led by IATA and the FAA during the CAEP/12 cycle (2019-2022).